NOTE: When completing the table, please list only the page number(s) specific to each Roman Numeral Section. If an item isn't applicable to the submitted application please list NA and include a brief reason why it isn't applicable.

I. STAND ALONE DOCUMENT DEMONSTRATING THE NO MIGRATION STANDARD		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Region 6 reviews all aspects of the no migration demonstration during the initial petition review and requests for petition reissuance.		A complete "stand-alone" document is provided for this reissuance.	
	1. Incorporate any deficiency responses into one document.	This submittal will be updated as needed during the review process.	
	a. Required for initial petition submissions.	This is a reissuance and the initial petition was approved in 1990.	
	b. Recommended for applications for reissuance of a petition.	A complete "stand-alone" document is provided for this reissuance.	

II. PETITION TABLE OF CONTENTS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Each application should include a Master Table of Contents located in the front of Volume 1.		**Master Table of Contents** is located in the front of this submittal. Individual Table of Contents also included at beginning of each individual section, **Sections 1 -7**.	
	1. Listing should also identify the volume number where the topic is located.	**Master Table of Contents** located in the document. Individual Table of Contents included at beginning of each section, **Sections 1 -7.**	
	2. The subsections contained in each section should be included in the Table of Contents.	**Master Table of Contents** includes subsections down to 5 levels. Individual Section Table of Contents includes subsections.	

II. PETITION TABLE OF CONTENTS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	3. A list of tables, figures, and appendices should be included in the Table of Contents.	**Master List of Tables, Figures, and Appendices** for **Sections 1-7** included with Master TOC. Individual lists included at beginning of each section.	
	4. Adding a Table of Contents for the specific section or appendix to the front of that specific section or appendix in the document is suggested for expediting the review process.	Individual Table of Contents also included at beginning of each individual section **Sections 1 –7** and **Section 2 Appendix 2-6**.	
B. Any appendices containing multiple documents should include a content listing to identify the items if they are not individually labeled or tabbed.		**Section 2 Appendices** with multiple documents (**Appendices 2-6 through 2-12**) contain contents listings in the first part of the appendix for ease of review.	

III. ADMINISTRATIVE		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Applicant			
	1. Facility name	**Section 1.1.1 Page 1-10** Dow Chemical Company Texas Operations, Dow Beaumont Aniline	
	2. Well numbers and corresponding state UIC permit numbers	**Section 1.1.1 Page 1-10** Well No. 3 (WDW188) Proposed Well No. 4 (WDW388) Well No. 7 (WDW391)	
	3. Addresses	**Section 1.1 2 Page 1-10** 5470 North Twin City Highway Suite A Nederland, Texas 77627	
	4. Mailing address	**Section 1.1 2 Page 1-10** P.O. Box 1646 Nederland, Texas 77627-1646	
	5. Facility and well physical address	**Section 1.1 2 Page 1-10** 5470 North Twin City Highway Suite A Nederland, Texas 77627	
	6. Telephone and facsimile numbers	**Section 1.1 2 Page 1-10 – (**409) 727-9231	

III. ADMINISTRATIVE		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
B. Facility Contact Information			
	1. Person(s) or firm(s) authorized to act on behalf of the applicant during the processing of the application	**Section 1.1 2 Page 1-10** Ms. Lisa Anderson Environmental Delivery Specialist	
	a. Address	**Section 1.1 2 Page 1-10** P.O. Box 1646 Nederland, Texas 77627-1646	
	b. Phone numbers	**Section 1.1 2 Page 1-10 –** (409) 727-9104, Office (409) 201-8224	
	c. E-mail address	ldanderson@dow.com	
C. Include A Signed Certification Statement As Listed In 40 CFR §148.22(A)(4).			
	1. Must be signed and dated following all final revisions to the document	Signed statement will be at the end of **Section 1**, submitted after the review process is complete.	
	a. Petitioner may wait to submit until the review process is completed	Signed statement will be submitted after review process complete.	
D. Summary Of Past Petition Related Approvals		**Executive Summary page 1** 1988 HWDIR Petition – Approved July 1990 1998 HWDIR Petition Reissuance – Approved November 2001 2001 Non-substantive Petition Reissuance – Approved December 2001 2015 Non-substantive Petition Reissuance Ownership Change –December 2015 (DuPont to Chemours) 2016 Non-substantive Petition Reissuance Ownership Change –June 2015 (Chemours to Dow*)*	
E. Quality Assurance And Quality Control			
	1. Describe processes used to verify that proper quality assurance and quality control plans were followed in preparing the petition demonstration-40 CFR §148.21(a)(4)	**Section 1.5 pages 1-23 -** Each section of the document is prepared by a member of the GKS or GeoHydroLogicPro technical team. Once the section is fully prepared, an initial review is performed. A DOW review of document is then	

III. ADMINISTRATIVE		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
		performed. A final review is performed and the document is assembled for submittal.	
	a. Confirm all referenced tables, figures, appendices, etc., are included in the document	**Section 1.5 page 1-23 -** When the review process is complete, the Master Table of Contents, Master List of Figures, Master List of Tables, and Master List of Appendices are generated and crossed checked with the complete document.	
F. Elevations			
	1. Clarify what depth reference elevations are used in the document	**Section 1.4 pages 1-14 thru 1-22 -** Depths are referenced to the original open-hole well log and are measured from the drilling rig Kelly Bushing elevation.	
	a. Confirm all depths listed include a reference datum	**Section 1.4 pages 1-14 thru 1-22 -** Depths are referenced to the original open-hole well log and are measured from the drilling rig Kelly Bushing elevation.	
	2. List the well elevations to allow depths to be converted to other reference depths	**Section 1.4.1.2 page 1-19** Well No. 3 (WDW188) KB= 30.6 ft **Section 1.4.2.2 page 1-20** Proposed Well No. 4 (WDW388) KB= TBD **Section 1.4.3.2 page 1-21** Well No. 7 (WDW391) KB= 32.2 ft	
G. Consistently Reference Specific Gravity Or Density Values Throughout The Petition.		Density referenced.	
	1. Use a consistent number of decimal places	**Section 1 page 1-7 -** Dow will use 3 decimal places for density values.	
	2. Always provide a corresponding reference temperature(s)	**Section 1 page 1-7** - a temperature of 70°F is referenced.	
	3. Volume weighted density/specific gravity ranges may be requested by facilities that do not inject a significant volume of immiscible fluid	**Section 1 page 1-7 -** Dow is requesting a volume weighted density range since the injected fluid contains minimal immiscible fluid.	

III. ADMINISTRATIVE		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	4. The timeframe for volume weighted density/specific gravity averaging may consist of any of the following		
	a. Three – whole calendar month	**Section 1 page 1-7 -** Dow is requesting a running three-whole calendar month volume weighted density range for tracking efficiency.	
	b. Running 90 or 91 day (13 week) period	**NA –** using three calendar months	

IV. UPDATED ADJACENT SURFACE LAND OWNER LISTING 40 CFR§124.10(C)(4)	PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Include the names and mailing addresses of the surface owners of the tracts of land adjacent to the plant boundaries.	**Figure 1-6 –** A map and table is provided that includes names and addresses of the surface owners of the tracts of land.	
B. Provide a map illustrating the location of the adjacent landowner tracts.	**Figure 1-6 -** A map indicating landowner tracts is provided.	
C. Describe surrounding land usage (farming, industry, residential, etc.).	**Figure 1-6** – Adjacent land use is industrial and residential.	

V. PETITION APPLICATION REQUESTS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Describe the specifics of the petition.			
	1. Identify the specific wastes and waste codes requested 40 CFR §148.22(a)(1)	**Executive Summary page 5 and Section 1.2 pages 1-7 and 1-8 -** A summary of requested Waste Codes is provided.	
	2. Specify the well or wells for which the demonstration will be made 40CFR§148.22(a)(1)	**Section 1.1.2 page 1-10** Well No. 3 (WDW188) Proposed Well No. 4 (WDW388) Well No 7 (WDW391)	

V. PETITION APPLICATION REQUESTS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	3. List the specific gravity/density range, injection intervals, end of operations date, injection rates, etc.	**Executive Summary page 5 and Section 1.0 page 1-7 -** Dow is requesting a running three-whole calendar month volume weighted density range from **0.986 g/cm^3 to 1.075 g/cm^3 at 70°F**. **Section 1.4 page 1-19 thru 1-21** - Table of requested Injection Interval and injection rate is provided for each well. **Executive Summary page 4 -** Requested exemption extension to end of year 2040. **Section 1.4.1.2 page 1-19** for Well No. 3 (WDW188), regulatory intervals and injection rate etc. **Section 1.4.2.2 page 1-20** for proposed Well No. 4 (WDW388), regulatory intervals and injection rates etc. **Section 1.4.3.2 page 1-21** for Well No. 7 (WDW391), regulatory intervals and injection rates etc.	
	4. For a reissuance or modification, specify the requested changes from the approved petition	**Executive Summary pages 3 thru 6 –** the requested changes are detailed	
B. Clarify if application consists of the containment of waste within the defined injection zone-40CFR§148.20(a)(1)(i), chemical fate demonstration-40CFR§148.20(a)(1)(ii), or a combination of both.		Application is for the containment of waste within the defined injection zone.	
	1. If a chemical fate demonstration is requested, additional documentation not covered in this outline will be required to satisfy 40CFR148.	**NA –** no chemical fate demonstration is requested.	

VI. LOCATION MAPS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Provide a USGS topographical map (1:24000 scales, if available) indicating the plant boundaries and well location(s).		**Figure 1-2 and 1-4** show the well locations and plant boundaries.	
B. Provide a simple schematic with a scale or distances listed illustrating the plant boundary and surface and bottom hole well locations of all facility disposal wells.		**Figure 1-4** shows the surface well locations and plant boundaries.	
	1. Include facility wells completed in other injection intervals (hazardous and non-hazardous)	**Figure 1-4** has a detailed map showing the relative locations of the active Lucite Injection Wells No. 1 (WDW100) and No. 2 (WDW101).	

VII. CHARACTERISTICS OF INJECTION FLUID 40CFR§148.22(A)		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Provide a brief summary of the operation or process that generates the injection fluids.		**Section 6.1.1 page 6-4 -** Waste stream is generated from the manufacturing of aniline.	
B. Describe the characteristics of the injection waste stream.			
	1. Discuss if the physiochemical nature of the waste streams are such that reliable predictions can be made to satisfy the standards outlined in 40CFR§148.20(a)(1)(i) or 40CFR§148.20(a)(1)(ii)	**Section 6.1 pages 6-3 thru 6-10 -** Reliable predictions can be made as the waste stream has remained fairly consistent over the past several years.	
C. Include a recent waste analysis.			
	1. Fully describe the chemical and physical characteristics of the subject wastes 40CFR§148.22(a)(2)	**Sections 6.1 pages 6-3 thru 6-10 -** provide a detailed characterization of the waste stream. **Appendix 6-1** also provides the Waste Stream Analysis.	
	2. Verify waste codes represent all applicable waste constituents and constituent concentrations do not exceed maximum concentrations used in the demonstration	**Section 6.0 page 6-2 -** provides the EPA Hazardous Waste Codes requested in this reissuance.	
D. Describe if waste analysis testing performed is accurate and reproducible 40CFR§148.21(a)(1).		**Appendix 6-1** - provides the Waste Stream Analysis. The waste analysis testing performed is accurate and reproducible. A certified lab performs the analysis according to approved methods, and samples are caught at the same	

VII. CHARACTERISTICS OF INJECTION FLUID 40CFR§148.22(A)	PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	location and approximate time frame each year. Annual sampling is performed as there is not a significant degree of variability in the waste stream.	
E. Clarify if estimation techniques used were appropriate and if EPA-certified test protocols were used, where available and appropriate 40CFR§148.21(a)(2).	**Appendix 6-1** - provides the Waste Stream Analysis.	

VIII. DISPOSAL WELLS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. General			
	1. Differentiate any plant well numbering system and Class I UIC permit numbers used in the document.	**Section 1.1.2 page 1-11** Well 3 (WDW188) Proposed Well 4 (WDW388) Well 7 (WDW391)	
	2. Provide well location description	**Section 1.4.1.1 page 1-19** for Well No. 3 (WDW188) **Section 1.4.2.1 page 1-20** for Proposed Well No. 4 (WDW388) **Section 1.4.3.1 page 1-26** for Well No. 7 (WDW391)	
	3. Include latitude and longitude	**Section 1.4.1.1 page 1-19** for Well No. 3 (WDW188) 30° 00' 59.9" N, 94° 01' 40.2" W **Section 1.4.2.1 page 1-20** for Proposed Well No. 4 (WDW388) 30° 00' 59.1" N, 94° 01' 41.2" W **Section 1.4.3.1 page 1-21** for Well No. 7 (WDW391) 30° 00' 58.9" N, 94° 01' 37.0" W	
	a. Provide and reference a copy of the well's Class I hazardous waste UIC permit and summarize the permit limitations	**Appendix 1-1 thru 1-3** provides copies of current UIC permits. A table of permit limits is also provided.	
	4. Provide relevant elevations (Ground Level(GL) and Kelly Bushing(KB))	**Section 1.4.1.2 page 1-19** Well No. 3 (WDW188) KB = 30.6 ft, GL = 13.76 ft **Section 1.4.2.2 page 1-20**	

VIII. DISPOSAL WELLS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
		Proposed Well No. 4 (WDW388) TBD **Section 1.4.3.2 page 1-21** Well No. 7 (WDW391) KB = 32.2 ft, GL = 12.2 ft	
	5. Define the KB depths to the Confining Zone, Injection Zone, and Injection Interval in the well	**Section 1.4.1.2 page 1-19** for Well No. 3 (WDW188) **Section 1.4.2.2 page 1-20** for Proposed Well No. 4 (WDW388) based on Well No. 3 **Section 1.4.3.2 page 1-21** for Well No. 7 (WDW391)	
B. Disposal well design			
	1. Include a detailed well construction and completion history	**Section 5.1 pages 5-2 to 5-24 -** Well No. 3 (WDW188) construction and completion history	
	a. Include sidetracks, abandoned boreholes, or remedial activity	**Section 5.1 pages 5-2 to 5-24 -** Well No. 3 (WDW188) has no sidetracks etc.	
	2. Include a wellbore schematic for each well	**Figure 5-2** Well No. 3 (WDW188) Current Completion Schematic	
	a. Consistently reference depths to the referenced elevation	Schematics show depths in reference to KB (Kelly Bushing).	
	b. For legibility, add expanded detail for complex wellbore construction, if needed	Schematic shows all completion details.	
	3. Provide daily drilling log or details on well recompletions	**Section 5.1.4 pages 5-5 to 5-6 -** Well No. 3 (WDW188) current completion detail	
	a. Summarize historical well work	**Section 5.1.5 pages 5-6 to 5-24 -** Well No. 3 (WDW188) well work details	
	4. List the depths and describe the specifics of tubular, cement, packers, etc. used in the completion of the well	**Section 5.1.3 and 5.1.4 pages 5-3 to 5-5 -** Well No. 3 (WDW188) details, see also **Figure 5-2. Appendices 5-3 and 5-4** present cement volume calculations and tubular stress calculations for Well No. 3 (WDW188).	
	5. Provide relevant logs to demonstrate the cement integrity of the well	The most recent RAT Log is located in **Section 7, Appendix 7-1** for Well No. 3 (WDW188).	

IX. MECHANICAL INTEGRITY TESTING-MIT		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Include a copy of the most recent mechanical integrity demonstration (RAT and annulus pressure test) for each well included in the application 40CFR§148.20(a)(2)(iv).			
	1. Demonstrate mechanical integrity of a well's long string casing, injection tubing, annular seal, and bottom hole cement	**Section 7.2 pages 7-3 thru 7-5** for Well No. 3 (WDW188) provides information demonstrating the mechanical integrity of the injection well.	
	2. Confirm that all injected fluids are entering the approved injection intervals and that no fluids are channeling up out of the injection zone near the wellbore.	**Section 7.2 pages 7-3 thru 7-5** for Well No. 3 (WDW188) provides information demonstrating that all injected fluids are entering the approved injection intervals.	
	a. Operators may be required to conduct a radioactive tracer survey (RAT) with multiple slug chases between the packer and injection interval to document casing integrity and no loss of fluid above the completed interval.	**Section 7.2 pages 7-3 thru 7-5** for Injection Well No. 3 (WDW188) provides information about the most recent RAT performed.	

X. OFFSET WELL(S)		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Provide a complete list of all facility disposal wells including other well classifications or wells completed in other intervals.		**Section 2.4.15 page 2-44 –** discusses the injection history at site and other injection wells at the site.	
B. Describe all pressure sinks and sources in the same injection zone located within a minimum 10 mile radial distance from the facility.		**Section 2.4.16 page 2-45 -** No pressure sinks or sources within 10-mile radius of Beaumont Works.	
	1. List all offset oil and gas production from the injection interval	**NA -** There is no production from the injection interval.	
	a. Provide well completion information or general field information	**NA -** There is no production from the injection interval.	
B. Describe all pressure sinks and sources in the same injection zone located within a minimum 10 mile radial distance from the facility.		**Section 2.4.16 page 2-45 -** No pressure sinks or sources within 10-mile radius of Beaumont Works.	
	2. List all offset injection wells completed in the same injection interval (Class I and Class II)	**NA –** no offset injection wells	
	a. Provide well completion information and wellbore schematics	**NA –** no offset injection wells	

X. OFFSET WELL(S)		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	3. Provide a map illustrating the location of sinks and sources	**NA –** no offset injection wells	
	4. Provide cumulative volumes for the sinks and sources completed in the injection interval	**NA –** no offset injection wells	
	a. Include supporting documentation for reported volumes	**NA –** no offset injection wells	
	b. Address oil, gas, or water production from producing wells	**NA -** There is no production from wells completed in the injection interval.	
C. Support the general area reviewed for pressure sinks or sources based on volumes and reservoir transmissibility.		**NA –** no offset injection wells	
	1. Include any modeling or analytical calculations, if applicable	**NA –** no offset injection wells	
D. Identify the source or potential sources of the pressure sink in under pressured injection intervals.		**NA –** no offset injection wells	

XI. INJECTION HISTORY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Report and document historical injection into the injection interval to date.			
	1. Site specific	**Appendix 2-6.9** presents historical injection volume data for the Dow Injection Well.	
	2. Offset wells	**NA –** no offsite wells	
	3. Oil and gas injection, enhanced recovery, or disposal wells	**NA –** no offset injection wells	
B. Provide and reference a summary table for the volumes injected into each modeled disposal well, including offset wells.		Summary table located in **Appendix 2-6.9** for injection 2000 thru 2017	
	1. List the volumes using the timeframes input into the model	**Section 2.4.15 page 2-44** discusses the waste disposal history. Injection volumes are included in **Appendix 2-6.9**.	
	2. Include a column in cubic feet per day for verification of SWIFT input, if applicable	**N/A –** DuPont Deepwell Models used	

XI. INJECTION HISTORY	PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
C. Based on historical injection, justify the maximum rates modeled during the operational period.	Modeled future rates are discussed in **Section 2-5.1, Page 2-46**. The maximum injection rate used was for operational flexibility.	

XII. UNDERGROUND SOURCE OF DRINKING WATER (USDW) DETERMINATION		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Define the depth to the lowermost USDW.		**Section 3.4.1.1 page 3-36 -** The base of the lowermost USDW is approximately 1,000 feet. **Appendix 3-20** is a structure map on base of USDW.	
	1. Explain how this depth was determined	**Section 3.4.1.1 page 3-36 and Appendix 3-20 -** The base of the lowermost USDW (<10,000 mg/l TDS) was determined by log analysis of wells within the Area of Review.	
	2. Provide logs, equations, and computations, if relevant	**Figure 3-12** provides lowermost USDW annotated cross section well logs.	

XIII. Regional Geology		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Discuss the regional geology		**Section 3.2 pages 3-3 thru 3-15** provide a discussion of the regional geology.	
	1. Describe the stratigraphy, depositional environments, tectonic history, and structural geology	**Section 3.2 pages 3-3 thru 3-15** provide a detailed discussion of the regional geology.	
	a. Include a geological stratigraphic column	**Figure 3-4** presents a stratigraphic column of the Eastern Gulf Coast.	
	b. Include supporting documentation i.e., maps, cross-sections, etc.	**Figures 3-4 to 3-10** present supporting figures, maps and cross sections of the regional geology.	
B. Discuss the regional hydrogeology			

XIII. Regional Geology		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	1. Describe aquifers and aquicludes	**Section 3.4.1 pages 3-34 to 3-36 and Figure 3-10 and 3-11** present a description of the regional hydrostratigraphy. Miocene and younger formations contain usable quality water (<3,000 milligrams per liter (mg/L) total dissolved solids (TDS)) and potentially usable quality water (<10,000 mg/L TDS) (base of lowermost USDW).	
C. Seismicity			
	1. Include a listing of historical seismic activity in the regional area (at least a 100-square mile area around the injection well(s)	**Section 3.2.1.1 and 3.2.1.2 pages 3-4 to 3-6** present data on seismic activity in area and **Figures 3-2, 3-3a and 3-3b** show seismic events in Gulf Coast to 2014.	
	a. Data should include intensity levels (using an international scale) and distances from the injection facility	**Appendix 3-4** presents a listing of earthquake data including a table of magnitude 3 or greater earthquakes and a NEIC earthquake search within 100 miles of the site.	
	b. Provide a risk assessment of induced seismicity due to injection activities based on a known induced seismicity formula	**Section 3.2.1.3 pages 3-6 to 3-10 -** Potential for induced seismicity is evaluated using the very conservative zero-cohesion Mohr-Coloumb failure criterion recommended by the USGS. The table on **page 3-10** presents injection interval pressure buildup indicating, that induced seismicity is not a factor at the site.	

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Provide a detailed description of the local geology.			
	1. Local geologic area should extend a minimum of 1 mile past the extent of the 10,000-year composite waste plume	**Section 3.3 pages 3-16 to 3-34 and Appendices 3-5 and 3-14 to 3-17 (Structure and Isopach Maps)** provide detailed information about the local geology.	
B. Include and reference a type log defining each of the following intervals.			

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	1. Confining zone	**Section 3.3.3 page 3-28 to 3-29 and Figure 2-4** present information and the type log defining the confining zone.	
	2. Injection zone	**Section 3.3.3 page 3-28 to 3-29 and Figure 2-4** present information and the type log defining the injection zone.	
	a. Containment interval	**Section 3.3.3 page 3-28 to 3-29 and Figure 2-4** present information and the type log defining the containment interval**.**	
	b. Injection interval	**Section 3.3.3.1 page 3-29 to 3-30 and Figure 2-4** present information and the type log defining the injection interval**.**	
C. Include an updated commercial structure map on the most applicable reference datum available.		**Figure 3-7** is a Top of Frio Structure Map.	
	1. Compare with the local geologic interpretation and discuss any anomalies	**Section 3.3 pages 3-16 to 3-34** present local geologic interpretation and **Appendices 3-5,3-6,3-14 thru 3-17 and 3-20** provide structure maps and isopach maps of the Base of USDW, Top of Confining Zone, Top of Injection Zone, and Frio Injection Interval.	
	2. Clarify if any geologic features illustrated on the commercial map are relevant to the no migration application	**Section 3.3 pages 3-16 to 3-34** provide information about structural features, faulting and Spindletop Dome at the site. The faulting associated with Spindletop Dome has been incorporated into the site modeling. The structural dip of the injection interval was also incorporated into the 10,000-Year plume extent modeling.	
	a. Address the vertical and horizontal extents of faults, if applicable	**Section 3.3.2 to 3.3.2.3 pages 3-21 to 3-28** discuss Fault Transmissivity at the site.	
D. Confining Zone			
	1. Define a confining zone located above the injection zone 40CFR§148.21(b)	**Section 3.3.3 pages 3-28 to 3-29, and Appendices 3-8 (all), 3-9 (all), and 3-14 (all)** provide	

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
		information about the confining zone located at approximately 2,850 feet.	
	2. Demonstrate the following for the Confining Zone 40CFR§ 148.21(b)(2)		
	a. Thickness	**Section 3.3.3 pages 3-28 to 3-29, and Appendix 3-8 (all)** show the thickness of the Confining Zone at the site to be approximately 860 feet.	
	b. Porosity	**Appendix 2-6** – porosity values are expected to be between 10% and 25%.	
	c. Permeability	**Table 3-6** shows the permeability of the Confining Zone at the site to be 10^{-5} millidarcies or less.	
	d. Areal extent and lateral continuity	**Appendices 3-14a and 3-14b** show the areal extent and lateral continuity of the Confining Zone at the site.	
E. Injection Zone			
	1. Demonstrate each of the following for the various strata in the injection zone 40CFR§148.21(b)(1)	**Section 3.3.3 pages 3-28 to 3-29, and Appendices 3-14e, 3-14f, 3-14g and 3-15** provide discussion of the injection zone at the site.	
	a. Thickness	**Section 3.3.3 pages 3-28 to 3-29, and Appendices 3-14e, 3-14f, 3-14g and 3-15** show that the Injection Zone at the site is approximately 4,000 feet thick.	
	b. Porosity	**See Crosswalk Item E.5** for information of the porosity of Injection Zone at the site. Porosity is also discussed in **Section 2.4.6**	
	c. Permeability	**See Crosswalk Item E.6** for more information about the permeability of the Injection Zone at the site. Permeability is also discussed in **Section 2.4.5**	
	(i) Include available core data and core analysis	**Tables 3-2, and 3-4** provides core data from the Frio Sand Injection Interval.	
	(a) Site specific, offset wells, area wells, or applicable literature references	**Section 3.3.3.1 pages 3-29 thru 3-30** provide site specific information.	

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	d. Areal extent	**Appendices 3-8, 3-8a, 3-9, 3-9a, 3-14f and 3-14g** present a structural map and cross sections of the areal extent of the Injection Zone.	
	e. Free of transecting, transmissive faults or fractures to prevent the vertical movement of fluids 40CFR§148.20(b) or (c)	**Section 3.3.1 thru 3.3.2.3 pages 3-16 to 3-28** present information about faulting at the site.	
	2. Provide available seismic lines to delineate the local structure of the injection zone if there is a lack of well data at the required depth	**Appendix 3-11 and 3-12 –** are unmarked and marked seismic lines.	
	3. Containment Interval		
	a. Identify the strata within the containment interval of the injection zone that will confine fluid movement above the injection interval 40CFR§148.20(b)	**Section 3.3.3 pages 3-28 and 3-29 -** beneath the site, the Anahuac shale above the Frio Sand injection interval will confine fluid movement.	
	(i) Discuss lithology and mineralogy	**Section 3.3.3 pages 3-28 and 3-29 -** discuss the lithology of the containment interval.	
	b. Show the containment interval is free of known of vertically transmissive faults or fractures 40CFR§148.20(b)	**Section 3.3.2.1 page 3-24 -** The overlying geologic section consists of sand and shale. The thick Anahuac shale will provide extensive shale-to-shale contacts along the fault plane, and will prevent waste migration out of the injection zone.	
	4. Injection Interval	**Section 3.3.3.1 pages 3-29 and 2-30 -** discuss the Frio Sand Injection Interval.	
	a. Demonstrate each of the following for the injection interval of the injection zone 40CFR§148.21(b)(1)		
	(i) Areal extent and lateral continuity	**Appendices 3-8, 3-8a and 3-9, 3-9a -** present strike and dip cross sections showing areal extent and lateral continuity of the injection interval.	
	(ii) Provide appropriate structure and isopach maps	**Appendices 3-5, 3-16 and 3-17** present structure map and ispoach maps of the injection interval.	
	b. Thickness		

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	(i) Base on several criteria, i.e., logs, isopach, cross-sections	**Section 3.3.3.1 pages 3-29 and 3-30** and **Appendix 3-16 and 3-17 -** Frio Sand averages approximately 200 feet over the area of concern.	
	5. Porosity	**Section 3.3.3.1 page 3-30 –** discuss the porosity of the injection interval. Core data is in **Appendix 3-19**.	
	a. Base on several criteria, i.e., logs, core data, core analyses, literature, interference tests, etc.	**Section 3.3.3.1 page 3-30 –** The average core porosity was approximately 27% for the Frio Sand Injection Interval.	
	6. Permeability	**Section 2.4.5 pages 2-19 to 2-20 and Tables 2-2 and 2-3** discuss the permeability data from cores and well testing. Injection/falloff tests data is presented in **Table 2-3.** Fall off tests are included in **Appendix 2-6**.	
	a. Include available core data and core analysis	**Table 2-2 -** contain core data information and analysis. The core data is contained in **Appendix 2-6** and **Appendix 3-19**.	
	(i) Site specific, offset wells, area wells, or applicable literature references	**Appendix 2-6** provides key literature. Injection/falloff tests data is presented in **Section 2.4.5** and historic tests are presented in **Tables 2-3**, and data is included in **Appendix 2-6.**	
	(ii) Refer to model input parameters	**Section 2.0 – Appendices 2-7 thru 2-11** provide model input parameters.	
	b. Hydraulic gradient 40CFR§148.21(b)(3)	**Section 3.4.3 pages 3-38 to 3-40** state the hydraulic gradient of the injection interval is very low with a calculated velocity of less than 0.1 feet/year.	
	(i)Provide appropriate literature references or calculations	**Section 3.4.3 pages 3-39 to 3-40 -** The velocity of natural flow rate in the Catahoula Formation can be calculated: V =$K/f \times dh/dl$. Where: *dh* = is the difference in head between the outcrop area and the Site, Thus: V = 0.3 ft/yr, or conservatively 0.5 ft/yr.	

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	(a) Reference gradients from pressure tests, if applicable	**NA –** pressure gradient data not needed	
F. Geologic Maps		**Appendices 3-5 to 3-10 and 3-14a to 3-17**	
	1. Include the following general features on structure, isopach, and base maps	**Appendices 3-5 to 3-10 and 3-14a to 3-17 -** present a base map, structure maps, isopachs and cross sections, including: Base of the USDW, the Top of Confining Zone, Injection Zone, and Frio Injection Interval structure maps, Confining Zone and Frio injection interval isopachs and strike and dip cross sections.	
	a. Map scale should be 1" to 2000'	**Appendices 3-5 to 3-10 and 3-14a to 3-17 -** map scales at 1" = 2,000 feet to fit standard plotter paper.	
	b. Outline the facility and AOR boundaries	**Appendices 3-5 to 3-10 and 3-14a to 3-17 -** facility and AOR are on maps.	
	c. Include appropriate legends, title blocks, and labeling	**Appendices 3-5 to 3-10 and 3-14a to 3-17 -** included on bottom left corner of maps.	
	(i) Wells not deep enough to penetrate the mapped datum should be designated as such, e.g., NDE	**Appendices 3-5 to 3-10 and 3-14a to 3-17 -** Wells labeled "NDE" on maps.	
	(ii) Wells with no logs available should be designated as such, e.g., NA	**Appendices 3-5 to 3-10 and 3-14a to 3-17 -** Wells labeled "NL" on maps.	
	d. Confirm the unique artificial penetration (AP) numbers are legible	**Appendices 3-5 to 3-10 and 3-14a to 3-17 -** well map identification numbers on maps.	
	(i) Expand portions of the map, if needed, for high well density areas	**NA –** no expansion needed.	
	2. Structure maps should be based on applicable geologic datum's	**Appendices 3-5 to 3-6 and 3-14c, 3-14d, 3-14f, 3-14g -** present Base of the USDW, the Top of Confining Zone, Injection Zone, and Frio Injection Interval structure maps with datum mean sea level.	
	3. Isopach maps should show areal extent and continuity of the specified intervals	**Appendices 3-14a, 3-14b, 3-14e, 3-15, 3-16 and 3-17 -** present isopach maps of Confining Zone,	

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
		Injection Zone, Anahuac Shale and Frio Injection Interval.	
	4. Illustrate cross-section lines on all maps or include and reference a separate cross-section index map that illustrates the wells included on all cross-sections	**Appendix 3-7 and 3-7a** present cross section Location Maps.	
G. Cross-Sections			
	1. Include a minimum of two structural cross-sections perpendicular to each other that extend beyond the 10,000-year waste plume areas	**Appendices 3-8, 3-8a and 3-9 and 3-9a** present strike and dip structural cross sections.	
	a. Include additional mini-cross-sections over specific regions to demonstrate specific geologic features, i.e., the extent of a fault	**NA –** no mini-cross sections needed.	
	(i) Include stratigraphic cross-sections based on a reasonable marker, if correlations are difficult	**NA –** no stratigraphic cross sections needed.	
	2. Include the following on each cross-section		
	a. Legend and title block with date last updated	**Appendices 3-8, 3-8a and 3-9 and 3-9a** - Title block in lower right corner.	
	b. Small scale map showing the cross-section line	**Appendices 3-8, 3-8a and 3-9 and 3-9a** - schematic map of line of section included.	
	c. Top and bottom of applicable intervals, i.e., injection interval, injection zone, confining zones, USDW, etc.	**Appendices 3-8, 3-8a and 3-9 and 3-9a** - regulatory intervals presented.	
	d. Document perforations or completion information, if relevant	**Appendices 3-8, 3-8a and 3-9 and 3-9a** - completion information included.	
	3. At a minimum, include the well name, artificial penetration (AP) number, operator, well status, total depth, KB elevation for each log posted on the cross-section	**Appendices 3-8, 3-8a and 3-9 and 3-9a** - Well information included above each geologic log.	
	4. Scale the cross-section so the depth scale is legible	**Appendices 3-8, 3-8a and 3-9 and 3-9a** - depth scale included and legible.	

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	5. Include and reference a copy of the actual logs included on the cross-section as an appendix	**Appendix 2-6.15** contains annotated logs of the wells used in the east-west and north-south cross sections.	
H. Reservoir Dip			
	1. Clarify if a variable structure or constant dip will be used for the no migration waste plume demonstrations	A constant dip is used in long-term modeling.	
	a. Constant dip	**Section 2.4.14 page 2-43 –** present the constant dip rate used for the low density waste plume. Note that no dip rate was used for the high density plume since it is neutrally buoyant.	
	(i) Justify the average dip angle used in the demonstration	**Section 2.4.14 page 2-43 -**provides justification for the average dip angle.	
	(a) Describe or illustrate on a map where and what depths were used	**Section 2.4.14 page 2-43 –** discusses dip rates and **Appendix 3-5** is the structure map.	
	(b) List the equations and variables input to calculate the average dip angles	Standard equations were used to calculate dip, dip rate (ft/mile) = rise (ft) /run (ft)* 5280 ft/mile. The value selected is shown in **Section 2.4.14 page 2-43**.	
	(ii) Variable dip.	**NA –** constant dip used	
	(a) Clarify what structure map was used for the model input	**Appendix 3-5** is the structure map used for model input.	
I. Provide a sufficient number of well logs to document the structural depths and thicknesses on the structure and isopach maps		**Appendix 4-2** contains well records and well logs of all wells in the Area of Review (AOR).	
	1. More data may be required for certain areas if correlations are difficult or unique geologic features exist	**NA –** no additional data needed	
J. Provide fracture gradient calculations and maximum surface pressure limitation.		Fracture gradient and maximum injection pressure calculations are presented in **Appendix 5-5**. Maximum surface injection pressure listed on **Section 1.4.1.2 page 1-19** for Well No. 3 (WDW188), on **Section 1.4.2.2 page 1-20** for proposed Well No. 4 (WDW388) and **Section 1.4.3.2 page 1-21** for Well No. 7 (WDW391) and	

XIV. LOCAL GEOLOGY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
		listed in the well operating permits contained in **Appendix 1-1 thru 1-3**.	

XV. GEOCHEMISTRY AND INJECTED WASTE COMPATIBILITY		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Describe the geochemical conditions of the well site 40CFR§148.21(b)(5).			
	1. Include the physical and chemical characteristics of the injection zone and the formation fluids in the injection zone	**Section 6.3 pages 6-11 thru 6-21** present hydrogeologic compatibility and other compatibility. Formation fluid characteristics is presented in **Section 6.3.1** and analytical data is included in **Appendix 2-6**.	
B. Discuss the compatibility of the injected waste with the injection zone.		**Section 6.3 page 6-12 thru 6-23** presents Waste Stream-Injection Interval Compatibility.	
C. Provide an analysis to demonstrate if the waste will adversely alter the confining capabilities of the injection and confining zones.		**Section 6.3 page 6-13 thru 6-23** discusses compatibility testing. No adverse reactions expected.	
D. Discuss compatibility with well construction.		**Section 6.3.4 page 6-20** presents waste compatibility with well construction.	

XVI. MODEL INPUT PARAMETERS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Initial and current hydrostatic pressure in the injection zone 40CFR§148.21(b)(4).			
	1. Provide a summary table that lists all historical shut-in pressures for wells completed in the injection interval(s)	**Table 2-4** provide a tabulation of all static pressures corrected to reference depth.	
	a. Compare with the initial static pressure assigned for the no migration demonstration	**Section 2.4.7 page 2-23, and Table 2-4** provide comparison of the static pressure assigned for the no migration demonstration.	

XVI. MODEL INPUT PARAMETERS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	2. Discuss how the initial reservoir pressure was selected based on the available data	**Section 2.4.7 page 2-23, and Table 2-4,** provides discussion of original formation pressures	
	a. Include all reference data needed to verify selected pressure value	**Table 2-4** provides historical static pressure measurements. Injection/Falloff test data is included in **Table 2-3** and **Appendix 2-6.8**.	
B. Transmissibility			
	1. Provide and summarize available historical pressure transient testing, i.e., drill stem tests, falloffs, injectivity, interference, pulse, etc., to support the injection interval transmissibility values used in the no migration demonstrations	**Section 2.4.5 pages 2-19 to 2-20, and Table 2-3,** present transmissibility and mobility information from injection/falloff tests.	
	a. Provide electronic copy of pressure transient tests for site specific and offset wells, if available	Documentation (electronic files) included in **Appendix 2-6.8.**	
	b. Include summary report, tables, and figures of pressure transient reports	**Table 2-3** presents reservoir test data. Reports are included in **Appendix 2-6.8**.	
	(i) Hard copy of recorded pressure and time data not necessary if plot of data is provided	Reports included in **Appendix 2-6.8** that contain a plot of the data and a copy of the recorded pressure and time data.	
	c. High and low-end transmissibility used in the demonstrations should be reasonably conservative based on available data	**Section 2.4.5 pages 2-19 to 2-20 and Table 2-3** present and discuss permeability values used. The permeability value used for the Frio Injection Interval was 625 md. Transmissibility values for the interval range from 203,139 md-ft/cp to 1,358,443 md-ft/cp.	
C. Effective Net Thickness			
	1. Discuss the selection of a conservative net thickness	**Section 2.4.4 pages 2-17 to 2-19** discuss layer thickness used for modeling computations.	
	a. Pressure buildup demonstration	**Table 2-1** provides thickness values used in the operational pressure model.	
	b. Plume migration demonstrations	**Table 2-1** provides thickness used in the operational plume model.	

XVI. MODEL INPUT PARAMETERS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	2. Include and reference copies of all criteria on which the net thickness values are based, i.e., logs, isopachs, cross-sections, historical temperature log summary and plots, seismic lines, literature, well tests, RATs, flow profile surveys, etc.	**Appendices 3-5 to 3-10 and 3-14a to 3-17** are the maps and cross-sections that net thickness values were based. Injection well logs are located in **Appendices 2-6.5** and **2-6.6** and well logs for wells in the Area of Review are located in **Appendix 4-2**.	
	3. Demonstrate how the selected effective net thickness values are conservative based on all available data	Interval thicknesses are discussed in **Section 2.4.4 pages 2-17 and 2-19.**	
	a. Provide and discuss all historical temperature survey results	Compilation of historic temperature surveys in Injection Well No. 3 is included in **Appendix 7-2**.	
	(i) Include a composite illustration of the temperature logs from the confining zone through the injection zone	Compilation of historic temperature survey included in **Appendix 7-2.**	
	(ii) Discuss and address any temperature anomalies	**NA –** no unexpected temperature anomalies were identified that were not related to past injection activities.	
	b. Provide copies of the RAT and flow profile surveys for the past 5 years	The 2018 RAT is contained in **Appendix 7-1** (Well No. 3). RATs for 2014-2017 are contained in **Appendix 2-6.10**. Flow profiles were not run.	
	(i) Discuss how the fill depth and slug chase results were considered in the net thickness determination	**Section 2.4.4 page 2-17** discusses layer thickness used for modeling computations. Fill depth and slug chase results were not considered in the net thickness determination.	
D. Effective Permeability			
	1. Referencing the transmissibility and effective net thickness discussions, identify a low and high range of permeability values	**Tables 2-2 and 2-3** provide the range of permeability values.	
	a. Discuss the effective permeability used in the pressure buildup demonstration	**Section 2.4.5 page 2-20 and Table 2-2 and 2-3** present and discuss permeability values used. The permeability value of 625 md was used for the Frio Sand.	

XVI. MODEL INPUT PARAMETERS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	b. Discuss the effective permeability used in the plume migration demonstrations	**Section 2.4.5.2 page 2-20** discusses the effective permeability used in the plume migration demonstrations.	
	2. Compare selected effective permeability values with available permeability data from pressure transient tests, core data, literature, etc.	**Section 2.4.5 pages 2-19 to 2-21** discusses permeability values used in the operational and long-term modeling (as well as **Section 2.5**). **Appendix 2-6.7** provides core data for the injection well and **Appendix 2-6.8** provides the falloff tests. **Table 2-1** presents modeling input parameters.	
	3. Describe how the selected effective permeability values are conservative based on all available data	**Section 2.4.5 pages 2-19 to 2-21 and Table 2-2 and 2-3** present how permeability values are conservative.	
E. Reference Temperatures			
	1. Designate a surface reference temperature for the requested specific gravity or density range of the waste stream	Reference surface temperature of 70°F is used for measuring density.	
	2. Specify a reservoir temperature of the injection interval and corresponding reference depth	**Section 2.4.9.1 page 2-30 -** The data show a gradient of 1.01°F per 100 feet of depth, with a temperature of 156° F at formation depth. Model reference depth of 7,437 feet is presented in **Section 2.4.7 page 2-23.**	
	a. Include support documentation to verify the reservoir temperature selection, i.e., a plot of the recorded temperatures versus depth from area well logs, temperature surveys, etc.	**Appendix 2-6.2** presents a plot of reservoir temperature with depth.	
F. Density or specific gravity values			
	1. Density or specific gravity values should have a minimum of two decimal places consistently used throughout the document, including the modeling	**Executive Summary page 5 –** Three decimal points are used throughout the document.	
	a. Two decimal places are recommended	**Executive Summary page 4 -** Three decimal points are used throughout the document.	

XVI. MODEL INPUT PARAMETERS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	b. Precision used in the model should be equivalent to the precision of the requested range	The three decimal places were used in the modeling see **Table 2-12.**	
	2. Specific gravity values should have temperature references for both the injectate and reference fluid, e.g., 60°F/60°F	**Section 2.5 page 2-46** a reference temperature of 70°F is used in the long-term model calculations.	
	3. Density values should have a single temperature reference	**Section 2.5 page 2-46** a reference temperature of 70°F is used in the long-term model calculations.	
	4. Provide any calculations used to convert density or specific gravity values at surface conditions to reservoir conditions or vice versa	A density nomograph **(Appendix 2-6.1)** was used to convert the low end and high-end waste density values at 70 °F to waste density values at 156°F for 10,000-year modeling.	
	5. Provide conversion calculations for input into models, e.g., conversion of density range to lb/ft³ for input into SWIFT	**NA –** DuPont Model Used.	
	6. Formation brine		
	a. Document how the density or specific gravity of the formation brine was selected and state the corresponding reference temp.	**Section 2.5.3 page 2-50 -** A salinity of 100,000 ppm was assumed for the formation fluid and the density was estimated at 156°F.	
	b. Include copies of all available formation fluid analyses	**Appendix 2.6.3** contains formation fluid samples.	
	c. Explain how equivalent solutions, i.e., NaCl, etc., were determined, if applicable	**NA -** A salinity of 100,000 ppm was assumed for the formation fluid in all intervals	
	7. Injectate		
	a. State requested density/specific gravity range of injectate &corresponding reference temps.	**Executive Summary page 5 -** Three-whole calendar month volume weighted density range from 0.986 g/cm³ to 1.075 g/cm³ at 70°F.	
	b. Include/discuss copies of injectate analyses	**Appendix 6-1** presents recent injectate sample analyses.	
	c. Explain how equiv. solns. determined, if applicable	**NA –** No equivalent solutions were used.	
G. Viscosity Values			

XVI. MODEL INPUT PARAMETERS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	1. Specify/document the reservoir fluid/injectate viscosities used in the no migration demonstrations	**Section 2.4.9 page 3-33 –** 0.52 cp is the viscosity for the Frio injection interval in the operational model and is summarized in **Table 2-1**.	
	a. Explain how equiv. solns. were determined, if applicable	**NA –** No equivalent solutions were used, see temperature and salinity values	
	b. Include copies of any monographs, tables, or references used	**Appendix 2-6.1** presents a density nomograph. **Appendix 2-6.2** presents a viscosity nomograph.	
H. Compressibility			
	1. Document rock/fluid compressibility used in demo	**Section 2.4.8 pages 2-24 to 2-30** present the compressibility documentation. Fluid compressibility is fixed in the DuPont Models.	
	2. Provide appropriate references, interference tests, etc. used to obtain the rock/fluid compressibility	**Section 2.4.8 pages 2-24 to 2-30, Table 2-1 and Appendix 2.6** present appropriate references, etc. used to obtain the rock/fluid compressibility.	
I. Porosity			
	1. Clarify the porosity value used in the demonstration is conservative based on porosity discussion included in geology portion	**Section 2.4.6.1 page 2-22** a porosity of 27 percent was used for Frio injection interval.	
J. Concentration Reduction Factor (CRF)			
	1. Provide a table listing the CAS number, applicable waste codes, health based limit, maximum concentration, resulting CFR for ea. Waste constituent, if applicable	**Appendix 2-6.12** has a spreadsheet that contains CAS number, waste codes, maximum concentration and resulting CFR. **Table 2-5** shows the CFR for each modeled compound.	
	2. Use 1×10^{-12} CRF and only include a list the waste constituents w/less than 100% concentration	**Section 2.4.10 page 2-33 -** The limiting CFR is 8.0E-12 which was rounded to 1.0E-12 for conservatism. Concentration reduction factors for the constituents are presented in **Table 2-5.**	
K. Background Gradient			
	1. Document the regional background gradient in feet/yr. and direction of movement	**Section 2.5.3 page 2-50 and Appendix 2.6.14 -** Flow rates in deep saline aquifers are generally less than one foot per year but 0.5 feet per year was used. A general easterly direction of regional flow is assumed.	

XVI. MODEL INPUT PARAMETERS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	a. Include any references, calculations etc.	**Appendix 2-6.14 –** contains the article "Groundwater Flow in Deep Saline Aquifer".	
	2. Clarify background gradients used in no migration demo	**Table 2-12** shows the background gradients used in low and high density modeling.	
	a. Don't use background gradient when modeling plume movement opposing gradient	No background gradient was used in low density modeling **Table 2-12** and **Section 2.5.3 page 2-50**.	
	b. Use max. or reasonably conservative value to est. plume move. in direction of background gradient.	Maximum 0.5 ft/yr gradient was used in high density modeling **Table 2-12** and **Section 2.5.3 page 2-50.**	
L. Dispersivity			
	1. State longitude and transverse dispersivities used in demo	**Section 2.4.13.2 page 2-43 –**The longitudinal dispersivity of 50 feet and transverse dispersivity of 5 feet were used.	
	2. Provide calc. and appropriate references to support the values selected	**Appendix 2-6.14** provides references to support values selected.	
M. Diffusion Coefficient			
	1. Document diffusion coefficients used to model waste plume move., if applicable	**Section 2.4.11 and 2.4.12 pages 2-35 to 2-37, and Appendix 2-4** provide information and a calculation example for a diffusion coefficient.	
	a. Include applicable doc., references or portion of references to support the assigned free water diffusivity coefficients	**Section 2.4.11 and 2.4.12 pages 2-35 to 2-37, and Appendix 2-4** provide information and a calculation example for a diffusion coefficient.	
	2. Provide a table listing the diffusion coefficient for each waste constituent or reasonably conservative value selected for the vertical diffusion demo	**Table 2-7** provides diffusivity values used in this reissuance.	
N. Include equations, calc., and reference docs. To justify other model input parameters used in the no migration demo, i.e., well index, hydraulic conductivity, etc.		**NA** – Dupont Models were used and no additional model input parameters were used.	
	1. Include calc. for SWIFT parameters, e.g., RAQ, DMEFF, etc., if applicable	**NA -** DuPont Models used	

XVII. MODEL SELECTION		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Keep models as simple as practical			
	1. Analytical calculations can typically be used for the heavy plume demo	Modeling "philosophy" discussed in **Section 2.2**	
	2. Constant dip and constant thickness models are preferred	Model strategies are discussed in **Section 2.5**	
B. Describe the numerical and analytical models used in the no migration demo		Analytical models are used.	
	1. Clarify what model is used for which portion of the demo	**Section 2.3 pages 2-5 to 2-14** describe the models used for the demonstration: DuPont Basic Plume Model, DuPont Multilayer Pressure Model, DuPont Vertical Fluid Permeation Model, DuPont Molecular Diffusion Model, and DuPont 10,000-Year Waste Plume Model.	
	2. Specify the version of modeling software used, if applicable	DuPont Models (2014) were used.	
C. Provide verification and validation for any predictive models used in the demo 40CFR§148.21(a)(3)		**Appendices 2-1 to 2-5** provide verification and validation of the predictive models used in the demonstration. Verification/Validation provided by DuPont.	
	1. Include or reference specific documentation	**Appendices 2-1 to 2-5** provide documentation on models used for demonstration. Verification/Validation provided by DuPont.	
D. Provide the applicable equations used by any analytical models		**Appendices 2-1 to 2-5** provide applicable equations used by the analytical models.	
E. Describe how the model is appropriate for the specific site, waste streams, and injection conditions of the facility operations		**Section 2.3 pages 2-5 to 2-14 -** Describe how the model is appropriate for the specific site, waste streams, and injection conditions of the facility. Model strategies are discussed in **Section 2.5**.	
F. Describe how the model was calibrated prior to use for predicting pressure buildup or plume movement		**Section 2.3.2 page 2-7 and Section 2.6 pages 2-51 to 2-54 -** The model is calibrated so the calculated model pressure matches the measured bottomhole flowing and/or shut-in- pressure history. No plume calibration was performed.	
G. Clarify the solution method used by the model and discuss appropriateness of the method selected, if applicable		**Section 2.3 pages 2-5 to 2-14 -** Discuss solution method and appropriateness of the modeling	

XVII. MODEL SELECTION	PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	method selected. Also presented in **Appendices 2-1 through 2-5.**	

XVIII. PRESSURE BUILDUP MODELS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. EPA R6 accepts both analytical soln. models and SWIFT for pressure buildup modeling		Analytical Models Used – DuPont Model Package.	
	1. If an analytical soln. model is submitted for pressure buildup demo:	DuPont Multilayer Pressure Model.	
	a. Include validation/verification discussion satisfying 40CFR§148.21(a)(3) and compare the model w/another widely accepted analytical model such as PanSystem or hand calc. such as those provided in SPE Monograph 5 Appendix C	**Appendices 2-1 to 2-5 and the DuPont Model Validation (2014)** provide verification and validation provided by DuPont.	
	b. If the petition pressure buildup demo involves fault boundaries, the validation/verification info should address this as well	**Appendix 2-1 and the DuPont Model Validation (2014)** provide verification and validation addressing faults using image wells. Verification/Validation provided by DuPont.	
	2. If the SWIFT model is used, include one of the following:	**NA -** DuPont Models used	
	a. Include a SWIFT sensitivity run w/larger grid to confirm the pressure buildup demo result is reasonable or doesn't change w/larger grid. This would address grid limit concerns	**NA -** DuPont Models used	
	b. Include a supporting analytical calc. to confirm SWIFT results	**NA -** DuPont Models used	
Note: The sensitivity model run(s) (SWIFT and/or analytical calc.) would also address requirements for sensitivity analysis under 40CFR§148.21(a)(6)		**Section 2.8 page 2-73 to 2-74** provides a sensitivity analysis for the operational modeling. A model run was made assuming that Fault "J" was not a sealing boundary to northwest and that	

XVIII. PRESSURE BUILDUP MODELS	PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	Fault "G" was the sealing boundary. Sensitivity model files are located in **Appendix 2-12**.	

XIX. NO MIGRATION DEMONSTRATION		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Clarify all timeframes contained in the demo.		Model calibration used monthly injection volumes and projected data used annual injection volumes.	
B. Initialization period, if applicable		**NA -** DuPont Models used	
	1. Run the model for a sufficient time to show model stability	**NA** - Analytical Models Used- DuPont Model Package.	
	2. Demonstrate no background gradient is generated by the model input for zero background gradient modeling	**NA** - Analytical Models Used- DuPont Model Package.	
	3. Verify the appropriate background gradient exists for the heavy plume model	**NA** - Analytical Models Used- DuPont Model Package.	
	4. Demonstrate background velocities present prior to injection in variable structure or variable thickness models	**NA** - Analytical Models Used- DuPont Model Package.	
	a. Illustrate or map the magnitude background velocities	**NA** - Analytical Models Used- DuPont Model Package.	
C. Historical Period			
	1. Include all historical injection from wells completed in the modeled injection interval	**Appendix 2-6.9** includes historical injection volumes from wells completed in the modeled injection intervals.	
	2. Include historical production, if applicable	**NA –** No production from injection intervals	
D. Modeled Operational Life		Operational modeling through the end of 2040.	
E. Run the model for the requested operational life		**Section 2.7 pages 2-55 to 2-72 and Section 2.9 page 2-75 -** The Flow and Containment modeling package modeled two time frames under the modified conditions: 1) End of 2040 (near future, based on maximum injection data). 2) A 10,000-year post-closure period.	

XIX. NO MIGRATION DEMONSTRATION		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	1. Use the maximum requested injection rates	**Section 2.5.1 page 2-46 -** Maximum injection rates were used for 2019 through end of 2040.	
	a. 10,000 year demo.	**Section 2.7.2 page 2-58 to 2-72** presents information on Post-Injection (10,000 year) Waste Distribution.	
	2. Buoyant plume	**Section 2.5.3 page 2-49 -** The driving force for the low density plume movement is buoyancy due to the density contrast between the waste and formation fluid.	
	a. Do not include an opposing regional background gradient to maximize plume movement	**Section 2.5.3 Page 2-49** - No background gradient used for low density waste plume.	
	3. Heavy plume	**Section 2.5.3 Page 2-50 –** The high-end density plume is the same density as the formation fluid at formation temperature.	
	a. Include background gradient, if in the down dip direction	**Section 2.5.3 page 3-50, Appendix 2-6.14 –** A value of 0.5 feet/year is used as background velocity for high end density plume.	
	b. Facilities that can demonstrate the lack of potential for future oil and gas development in vicinity of inj. well facility, /geol. environment, lack of structural trap, in area of inj. well facility, Region 6 requires min. 200 yr. heavy waste plume demo w/appropriate background gradient (EPA HDQTRS policy assuming oil/gas production will cease w/i 200yrs)	**Section 2.7.2.3.2 page 2-71 –** The area in the vicinity of the site is void of hydrocarbons within the injection zone. Therefore, it is appropriate to evaluate the High Density Plume over a shorter time span. A conservative time period of 1,000 years was chosen for the evaluation period.	
E. Run the model for the requested operational life			
	(i) Wells located w/i the heavy plume and outside the cone of influence(COI), lack a mechanism for waste to migrate vertically upward making the shorter demo sufficient to demo that waste will not migrate vertically upward in an abandoned well for 10,000 years	**Section 2.7.2.3.3 page 2-72 –** The heavy plume is located within the low density plume and formation pressures will have decayed and no force capable of driving effluent out of the injection intervals is present shortly after injection has ceased. Therefore, after 1000 years, there will	

XIX. NO MIGRATION DEMONSTRATION		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
		be no driving force to move the High Density Plume.	
F. Modeled Boundaries			
	1. Clarify what type of outer boundary conditions were implemented on all sides of the model grids and document the appropriateness of the selected boundary	**Section 2.5.2 pages 2-46 to 2-48** discuss model boundary conditions.	
	2. Describe any no flow boundaries input in the model and what the boundaries represent, i.e., symmetry, fault, pinch-out, etc.	**Section 2.5.2 pages 2-46 to 2-48 and Figure 2-5 and 2-6** discuss model boundary conditions and shows boundaries and image wells.	
	a. Describe how no flow boundaries were input in the model	**Section 2.5.2 pages 2-46 to 2-48 and Figure 2-5 and 2-6** discuss model boundary conditions and shows boundaries and image wells. Image wells were used to simulate the Port Neches Dome, Fault A1, Fault J and Spindeltop Dome. Fault A is the model simulated fault. DuPont Models employed automatically generate appropriate image wells on the other side of the model input boundary (Fault A) or to the south.	
	(i) Document the number and location of image wells was sufficient, if applicable	**Section 2.5.2 pages 2-46 to 2-48 and Figure 2-5 and 2-6 –** There are a total of six input image wells to simulate the Port Neches Dome, Fault A1, Fault J and Spindeltop Dome. A model image well is created for each input image well and active injection well north of model input boundary (Fault A). Dr. Robert Wattenbuger has reports located in Appendix 2-6 supporting this.	
G. Document the modeled injection rates for all wells included in demonstration, including production wells if appropriate		**Section 2.1 page 2-1 -** The projected injection rate is presented.	
	1. Historical period		
	a. Provide qtrly inj. reports for most recent five year history	**Appendix 2-6.9 -** provides historical injection volume data with quarterly injection reports provided for most of the historical injection period.	

XIX. NO MIGRATION DEMONSTRATION		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	b. Provide annual inj. volumes for six plus year well histories	**Appendix 2-6.9 -** provides historical injection volume data with quarterly injection reports provided for most of the historical injection period. The annual injection volume is included in the fourth quarter injection report.	
	c. More rigorous inj. data can be provided and used, if desired	**NA -** Monthly and annual injection data is all that was used.	
	2. Requested operational period	A reissuance for extending the operational period to the end of 2040 is being requested.	
	3. Area or offset well rates during post-operational period, if applicable	**NA –** The Lucite injections wells are not in communication with the Frio Sand Injection Interval and are therefore not included.	
H. Address any area geologic features			
	1. Clarify what geologic features are included in each demo (pressure buildup, plume, etc.)	**Section 2.4.3 pages 2-16 and 2-17** present the geologic input parameters required for the no migration demonstration modeling. Boundaries are presented in **Section 2.5.2.**	
	2. Clarify how the geologic features are included (image wells no flow boundary, etc.)	**Section 2.4 pages 2-15 to 2-45** present Model Input Data and Sources. Boundaries are discussed in **Section 2.5.2**.	
	3. Provide sufficient documentation for exclusion of any geologic feature, i.e., analytical calc. showing no impact on pressure buildup	No exclusions beyond the sealing faults associated with Spindletop Dome were used.	
I. Document the assumptions used in low density waste plume demo			
	1. Low-end of the density range compared to formation fluid	**Section 2.5.3 page 2-50 -** The low-end density plume is lighter than the formation fluid and will move up-dip (westward) from the facility due to buoyancy effects. Fluid properties presented in **Section 2.4.9.**	
	2. Exclusion of a background gradient to maximize up dip plume movement	**Section 2.5.3 page 2-50 -** In order to maximize the amount of horizontal movement in the 10,000-year time frame, no background down dip velocity is used for the low-end density model cases. The	

XIX. NO MIGRATION DEMONSTRATION		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
		only driving force for plume movement is buoyancy due to the density contrast between the waste and formation fluid.	
J. Document the assumptions used in the high density waste plume demo			
	1. High-end of density range compared to formation fluid	**Section 2.5.3 page 2-50 -** The high end density plume is the same density as the injection interval formation fluid. Fluid properties are presented in **Section 2.4.9.**	
	2. Use of a background gradient to maximize the down dip movement	**Section 2.5.3 page 2-50 -** In order to project the maximum amount of down-dip plume movement, the high-end density plume case is run with a natural background groundwater velocity of 0.5 foot per year oriented to the east.	
K. Document the assumptions used in the vertical diffusion demo			
	1. Describe the depth, w/i the inj. interval, used as the starting point for the max. vertical diffusion movement	**Section 2.7.2.2 pages 2-58 to 2-61, Figure 2-13 and Appendix 2-9 -** The depth used for the starting point of the vertical diffusion movement corresponds to the shale aquitard layer overlaying the Frio Sand Injection interval.	
	2. Specify the max. vertical movement used for the no migration demo into intact strata and the appropriate mud-filled or brine filled wellbore	**Section 2.7.2.2 page 2-60 -** The maximum predicted overall vertical waste incursion is predicted to be less than 245 feet.	
	3. Describe the method selected to determine the max. vertical diffusion	**Section 2.7.2.2 page 2-60 -** The overall maximum (conservative) vertical incursion of waste into the aquitard overlying the Frio Sand is obtained by adding together the results from the molecular diffusion calculation (227 feet) and the vertical permeation value from year-end 2040 (18 feet). Model described in **Appendix 2-4.**	
	a. List the vertical diffusion distances for each waste constituent and calc. used for determining the max. vertical diffusion distances	**Section 2.7.2.2 pages 2-68 to 2-69** - present an example calculation of vertical diffusion distance. **Table 2-11** provides diffusion distances for constituents of concern.	

XIX. NO MIGRATION DEMONSTRATION		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	b. Justify use of a worst case constituent and how it was applied in the demo	**Table 2-11** - the most mobile molecule is acrylonitrile and it has a vertical diffusion distance of 227 feet.	
	c. Apply a 1000' vertical diffusion distance and do not document the free water diffusivity coefficient for the various constituents	**NA –** individual compounds modeled	
	(i) Facilities w/brine-filled APs may be required to make additional diffusion calc. if specific circumstances exist	**NA –** no brine filled boreholes	
L. Results-Clarify the movement of waste from inj. operations will not result in the vertical movement of waste from the inj. zone or laterally w/i the inj. zone to a point of discharge or interface w/a USDW		**Section 2.7.2.2 page 2-62 -** A minimum of 653 feet of net shale or net shale equivalent is present between the top of the Frio Sand Injection Interval and the top of the injection zone. Based on these values, it is demonstrated that the injected waste will be contained within the injection zone and not migrate vertically upward out of the injection zone within 10,000 years.	
	1. Total vertical movement of waste from inj. operations and diffusion	**Section 2.7.2.2 page 2-60 -** There is no vertical permeation of fluids out of the Injection Zone. The maximum amount of vertical permeation of fluids into the aquiclude and diffusion will not exceed 245 feet.	
	2. Document the max. pressure buildup	**Section 2.9 page 2-75 -** The maximum pressure increase will not exceed 605 psi.	
M. Document any convergence or material balance errors and demonstrate values are insignificant		**NA**-Analytical Models Used- DuPont Model Package	
N. Document the model grid and cell sizes are appropriate for demonstration		**NA**-Analytical Models Used- DuPont Model Package	
	1. Discuss how the grid orientation, cell size, etc. was selected	**NA**-Analytical Models Used- DuPont Model Package	

XX. PLOTS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Document the plotting program used to illustrate model results accurately depicts the model output and does not distort the plume boundary		**Section 2.3 pages 2-5 and 2-6 -** DuPont Basic Plume Model output data (.plt plotting files) are imported to Microsoft EXCEL®. A Microsoft EXCEL® "macro" is then used to prepare geographically referenced (and scaled) x,y "comma-delimited" data files from the model output .plt file arrays. The output files are then posted in Golden Software, Inc.'s Surfer® 13 package. For Dow Beaumont Plant, plume perimeter plots are overlain on a digital basemap. DuPont 10,000-year Waste Plume Model output data (.out plotting files) are run through a FORTRAN conversion routine available on a PC computer that creates a Surfer GS ASCII GRD file in ASCII format for each model time step. This scaled x,y,z "comma-delimited" grid file from the model output .out file arrays file is then contoured in Golden Software, Inc.'s Surfer® 13 contouring package.	
B. Provide an outline of the operational plume, up dip and down dip plumes overlain on a structure map of the inj. interval		**Figures 2-10 to 2-12** - present the outline of the operational plumes.	
	1. Include an outline or overlay of the grid area	**NA –** DuPont model used	

XXI. SENSITIVITY ANALYSIS		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Perform a sensitivity analysis in order to determine the effect of uncertainties associated w/model parameters 40CFR§148.21(a)(6);Preamble to the July 26, 1988, Final Rule for 40CFR Part 148, page 28129		**Section 2.8 pages 2-73 to 2-74. Appendices 2-1 to 2-5 and 2-12.**	
	1. Identify areas where uncertainty is present in the geologic description or reservoir characterization	**Section 2.8 pages 2-73 to 2-74–** Some uncertainty exists in the selection of the primary model parameters (thickness, porosity, permeability, viscosity and compressibility) but the models are calibrated and by selecting conservative values for the primary parameters assures that the model is conservative and uncertainty is reduced. The model is more sensitive to decreases than to increases in sand thickness. The model is more sensitive to decreases in sand permeability than to increases in sand permeability. The model is more sensitive to increases in sand compressibility than to decreases. The models are more sensitive to increases in confining shale compressibility and permeability than to reduction in these parameters **Appendices 2-1 to 2-5.** A sensitivity model was run assuming that Fault J is non-sealing and Fault G is the sealing fault northwest of site. **Appendix 2-12** contains model run and data.	
	2. Determine a likely range of values and perform sensitivity analyses which would address the impact of the uncertainty, if applicable	Parameter selection is discussed in **Section 2.4**, reasonably conservative values applied.	
	a. Assign reasonably conservative parameters to maximize the pressure buildup and waste movement using appropriate estimation techniques and testing protocols 40CFR§148.21(a)(2)	**Section 2.8 page 2-73 and 2-74** - By selecting the conservative end of the value or certainty range for each model, contaminant transport and pressure buildup has been overestimated in the model results).	

XXII. CONE OF INFLUENCE (COI)		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Define the minimum COI- 40CFR§148.20(a)(2)(i)		**Section 4.0** Area of Review	
	1. Include all COI eq., calc., and values assigned to the various eq. parameters	**Section 4.3 pages 4-6 thru 4-11** provide equations and calculations used to determine the COI.	
	a. Demonstrate the assigned values are conservative, i.e., brine-filled wells, mud-filled wells, minimum mud weight	**Section 4.0 pages 4-1 thru 4-40** demonstrate the assigned values are conservative.	
	2. Overlay the COI contour from the max. pressure buildup demo. On a map to illustrate which wells are located w/i COI, if applicable	The Cone of Influence is represented in **Figures 4-6 thru 4-8**. The Cone of Influence is denoted on each figure.	
	a. Pressure contour frequency should allow reviewer to easily est. the max. pressure buildup at each AP location, if pressure buildup info is not available elsewhere in the document	The pressure buildup at end of 2040 is presented in **Figures 2-15 to 2-20.**	
B. Skeleton type wellbore schematics should be provided for each AP located w/i the COI. The wellbore schematics should include:		**Appendix 4-3** provides schematics for APs in the COI.	
	1. Unique AP number	**Appendix 4-3, Tables 4-1 thru 4-3 –** indicate unique AP number**.**	
	2. Well name and number	**Appendix 4-3, Tables 4-1 thru 4-3 –** indicate well name and number.	
	3. Well location	**Appendix 4-1, Figure 4-1 thru 4-3 –** show well location.	
	4. Name of operator	**Appendix 4-3, Tables 4-1 thru 4-3 -** indicate operator name.	
	5. Well status	**Appendix 4-3, Tables 4-1 thru 4-3 –** indicate well status	
	6. Basic well drilling and construction info. critical to the well's evaluation, e.g., total depth, hole sizes, casing size and setting depth cementing info, plug depths, mud weights, etc.	**Appendix 4-3, Tables 4-1 thru 4-3 –** provide well drilling and construction info.	
	7. Operators may also include additional info to expedite the review. This data may include:		

XXII. CONE OF INFLUENCE (COI)		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	a. Reference depths	**Appendix 4-3, Tables 4-1 thru 4-3 –** reference depth is indicated.	
	b. Well elevation	**Appendix 4-3, Tables 4-1 thru 4-3 –** well elevation indicated.	
	c. Regulatory interval depths: USDW, confining zone, inj. zone, and inj. interval	**Appendix 4-3, Tables 4-1 thru 4-3 –** regulatory interval depths indicated.	

XXIII. AREA OF REVIEW (AOR)		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Describe the AOR used in the demonstration 40CFR§148.20(a)(2)(i)			
	1. At a minimum, use a 2-mile radius around the well(s)	**Section 4.0 page 4-1 –** A radius of the cone of influence is less than two miles for the Frio Injection Interval.	
	2. Specify a larger AOR based on the COI, if necessary	**Section 4.3 page 4-12 -** In this Reissuance request the COI is less than 2.0-mile radius.	
B. Locate and identify all APs located w/i the larger of the COI or AOR using acceptable protocol 40CFR§148.20(a)(2)(ii)		**NA –** no larger AOR needed.	
	1. Use a unique numbering system so there are no duplicate AP numbers	**NA –** no larger AOR needed.	
	2. Include sidetracked or abandoned wellbores w/i a current completion or plugged well	**NA –** no larger AOR needed.	
C. Ascertain the condition of all APs located w/i the larger of the COI or AOR that penetrate the inj. zone or confining zone 40CFR§148.20(a)(2)(ii)			
	1. Use acceptable protocol	**NA –** no larger AOR needed.	
	2. Identify all wells w/i the AOR and assign a unique AP numbering system	**NA –** no larger AOR needed.	
	a. Document any water wells that penetrate the confining zone	**NA –** no larger AOR needed.	

XXIII. AREA OF REVIEW (AOR)		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	3. Verify the well status of any active or temporarily abandoned wells	**NA –** no larger AOR needed.	
D. Demonstrate that all wells are properly constructed or plugged to prevent the migration of waste from the inj. zone based on the max. pressure buildup demo 40CFR§148.20(a)(i)-(iii)		**Table 4-1 thru 4-3 and Appendix 4-3** provide a list of APs in the AOR and well records for these wells.	
E. Provide sufficient well records that are grouped and separated for each well (Tabulation of AP well data not required)		**Appendix 4-3 –** contains well records.	
	1. Level of documentation required for each well is dependent on whether the well penetrates the confining zone, inj. zone, or inj. interval and if the well is located w/i the COI or waste plume	**Table 4-1 thru 4-3 and Appendix 4-3** provides a list of APs in the AOR and well records for these wells.	
	2. Documentation may include scout tickets log headers, etc. to verify the location of plugs, casing, mud weights, etc.	**Table 4-1 thru 4-3 and Appendix 4-3** provide a list of APs in the AOR and well records, schematics, scout tickets and logs for these wells.	
	3. Identify all wells that are not constructed or plugged to satisfy the no migration standard	**Table 4-1 thru 4-3 and Appendix 4-3** provide information on well construction and plugging records. Screening wells identified in **Table 4-3** and modeling included in **Section 4.5 and 4.6 pages 4-31 thru 4-39.**	
	a. Provide corrective action plan for any such wells 40CFR§148.20(a)(2)(iii)	**Section 4.6 pages 4-36 thru 4-39** provide the modeling requirements for wells requiring further evaluation for the no migration standard. **No corrective action required.**	
	4. Use tabs to separate blocks of well records to facilitate record review	**Appendix 4-3 –** contains well records.	

XXIV. WASTE PLUME BOUNDARIES	PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Locate and identify all APs located w/i the 10,000-year waste plumes (Tabulation of AP well data is not required)	**Table 4-2** Artificial Penetrations within the Modeled Long-Term Plume track includes APs in the 10,000-year plume.	

XXIV. WASTE PLUME BOUNDARIES		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	1. Overlay the composite plume on a base map	**Appendix 4-2F** shows the composite long-term plume overlain on the basemap.	
	2. Use a unique AP numbering system so there are no duplicate AP numbers	**Table 4-2 and Appendix 4-2F –** unique AP numbering system used.	
	3. Include sidetracked or abandoned wellbores w/i a current completion or plugged well	**Table 4-2 and Appendix 4-2F and 4-3 –** all sidetracked and abandoned data included.	
B. Ascertain the condition of all APs located w/i the 10,000-year waste plumes that penetrate the injection zone			
	1. Use acceptable protocol	**Appendix 4-4** presents the Artificial Penetration Protocol.	
	2. All wells outside the AOR, but w/i the composite plume boundaries should be identified and assigned a unique AP number	**Table 4-1 thru 4-3 and Appendix 4-3 –** unique AP number used.	
	3. Verify the well status of any active or temporarily abandoned wells	**Table 4-1 thru 4-3 and Appendix 4-3 –** well staus indicated.	
C. Demonstrate these wells are properly plugged or constructed so that no waste would migrate from the inj. zone due to buoyancy or molecular diffusion in an AP – 40CFR§148.20(a)(1)		**Section 4.7 pages 4-40 thru 4-45, Table 4-2 and Appendix 4-3**	
	1. Brine filled wellbores do not pass the no migration standard if located w/i a buoyant plume	**NA –** None Found	
D. Provide sufficient well records that are grouped and separated for each well (AP summary tables are not required)		**Table 4-1 thru 4-3 and Appendix 4-3** provide a list of APs in the AOR and well records, schematics, scout tickets and logs for these wells.	
	1. Level of documentation required for each well is dependent on whether the well penetrates the confining zone, inj. zone, or inj. interval and if the well is located w/i the COI or waste plume	**Table 4-1 thru 4-3 and Appendix 4-3** provide a list of APs in the AOR and well records, schematics, scout tickets and logs for these wells.	
	2. Documentation may include scout tickets, log headers, etc. to verify the location of plugs, casing, mud weights, etc.	**Table 4-1 thru 4-3 and Appendix 4-3** provide a list of APs in the AOR and well records, schematics, scout tickets and logs for these wells.	

XXIV. WASTE PLUME BOUNDARIES		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	3. Identify all wells that are not constructed or plugged to satisfy the no migration standard	**Table 4-1 thru 4-3 and Appendix 4-3** provide a list of APs in the AOR and long-term plume, and well records, schematics, scout tickets and logs for these wells.	
	a. Provide corrective action plan for any such wells – 40CFR§148.20(a)(2)(iii)	**Section 4.5 pages 4-31 thru 4-35** provide the modeling requirements for wells requiring further evaluation for the no migration standard. **Table 4-3** presents results of pressure buildup comparison with allowable pressure at each well requiring further evaluation for the no migration standard. **No corrective action required for any wells.**	
	4. Use tabs to separate blocks of well records to facilitate record review	**Appendix 4-3** lists individual well records in folders listed by Map ID Number.	

XXV. Implementation and Compliance Section		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
A. Describe documentation in place at the facility that allows verification of compliance with no migration petition approval conditions		**Section 6.4 pages 6-21 to 6-23** describe compliance method including waste density measurement procedures and calculation for the three-whole calendar month volume weighted average waste density.	
B. Note: Documentation maintained for UIC permit compliance may not be sufficient for the no migration petition compliance		Implementation and compliance is detailed on **Section 6.4 pages 6-21 and 6-23**.	
	1. Provide a simple waste stream flow diagram	**Figure 6-2** is a waste stream flow diagram.	
	a. Illustrate sampling points and metering equipment	**Figure 6-2** is a waste stream flow diagram and sampling points and metering equipment are shown.	
	2. Waste stream density or specific gravity compliance	**Section 6.4** describes compliance method.	
	a. Describe how the facility will comply with petition requested range	**Section 6.4** describes compliance method.	

XXV. Implementation and Compliance Section		PAGE NUMBER(S) IN DOCUMENT WHERE INFO IS LOCATED	
	(i) Records maintained at the facility should list the density/specific gravity range at the referenced temperature	**Section 6.4.6 page 6-23** provides location of density values at 70^{o}F.	
	b. Describe any temperature compensation or correction methods, if applicable	**NA - Section 6.4 page 6-22** indicates that temperature correction is factory programmed.	
	(i) Include an example of the temperature correction process if completed manually	**NA - Section 6.4 page 6-22** indicates that temperature correction is factory programmed.	
	3. Describe the instrument and measurement methodology	**Section 6.4 page 6-22** describes the instrument and measurement methodology.	
	4. List the measuring and metering equipment calibration schedule	**Section 6.4 page 6-24** The meters are verified in proper working order/condition on quarterly schedule.	

USE OF REASONABLY CONSERVATIVE VALUES

The "reasonably conservative values" term is discussed in the Preamble to the July 26, 1988, Final Rule for 40CFR Part 148, page 28129. Region 6 allows the use of reasonably conservative or estimated values when site specific data is unavailable or limited- 40CFR§148.21(a)(5). The demonstration should include supporting information from literature or other sources to support these values. The reviewers will establish suitable conservative values, resulting in the protection of human health and the environment, during the petition evaluation. Sensitivity analysis or selection of some values may be more sharply defined because of the availability of site specific or field data.

MODIFICATION

The regulations contained in 40CFR§148.20(f) allow for modification to an approved exemption to include additional waste or wastes. The modification application must demonstrate the requested wastes behave hydraulically and chemically in a manner similar to previously included wastes and will not interfere with the containment capability of the injection zone.

REISSUANCE

The regulations contained in 40CFR§148.20(e) allow for reissuance of an approved exemption to modify any conditions placed on the exemption. The reissuance demonstration must also meet the no migration criteria.

PUBLIC NOTICE

EPA will issue a public notice – 40CFR§148.22(b), with a minimum 45-day public comment period required by 40CFR§124.10(b)(1) for all proposed decisions. Should EPA decide to hold a public hearing, a minimum 30-day public notice will be given prior to the hearing- 40CFR§124.10(b)(2).

FINAL DECISION

EPA will publish final decisions in the Federal Register as required by 40CFR§148.22(b)

PETITION CONDITIONS

In accordance with 40CFR§148.20(d)(2), Region 6 typically requires certain annual monitoring placed as a condition of petition approval.